In this article I describe and assess a service-learning project in which college students, in the context of a psychology course, served as auxiliary math teachers in a public elementary school. They met with an assigned group of students 3 hr per week for a semester. The college students studied and then applied principles from a broad spectrum of psychology including cognitive, developmental, and educational psychology. This experience in applying psychology outside the classroom both enhanced their appreciation of psychology and fulfilled their desire for community service. The elementary school students benefited as well; mean math ability increased over the course of the semester.

Never doubt that a small group of committed people can change the world. Indeed, it’s the only thing that ever has.

—Margaret Mead (1964, p. 49)

After 25 years as a psychology professor, I wanted to try something new. Recognizing that undergraduate students need to see applications of psychology to maintain their interest in the discipline, I developed a service-learning course in which students served as auxiliary math teachers in a public elementary school.

Service learning in higher education dates back to the 1920s when civic education was considered a key factor in promoting a democratic society (Carver, 1997). Theoretically, the roots of service learning in this country are grounded in Dewey’s (1938) notion of experiential learning—the idea that there should be a link between students’ education and their lives outside of school. Although this educational philosophy has not always been popular, the number of service-learning college courses has increased in the last decade (Stukas, Clary, & Snyder, 1999; Underwood, Welsh, Gauvain, & Duffy, 2000). The success of service-learning courses has been documented both in terms of college student satisfaction (Chapdelaine & Chapman, 1999; Clements, 1995; Hardy & Schaen, 2000) and the usefulness of the programs to the communities served (Hardy & Schaen, 2000; Raupp & Cohen, 1992).

This program is a university–community partnership in which college students obtained field work experience as auxiliary math teachers in a public elementary school. The poor showing of U.S. students in cross-cultural comparisons of mathematics achievement (e.g., National Research Council, 1989; Stevenson, Lee, & Stigler, 1986) fostered my interest in developing a service-learning course that focused on teaching mathematics. I assessed this program from the point of view of the major stakeholders.¹

Course Design and Implementation

I developed a four-unit undergraduate course, “Field Work in Applied Psychology: Teaching Mathematics.” Fifteen students (maximum enrollment for a field work course) enrolled. Nine students were psychology majors; most were second-year students.

Each college student served as an auxiliary math teacher for a group of 10 or fewer fourth-, fifth-, or sixth-grade students. Each college student maintained the same math group throughout the semester and met with his or her math group twice a week for 90 min per session. This math instruction supplemented the regular math instruction by the classroom teachers. To promote the autonomy of the college student teachers, they met their math groups outside the regular classrooms.

Students maintained field notes for each session taught and e-mailed them to me after each session. Students organized field notes around the following four subheadings:

1. What topic did you present?
2. What specific teaching strategies did you attempt?
3. How effective were the strategies you attempted to implement?
4. Notable insights. (What did you learn about your students, the teaching of mathematics, or yourself?)

The classroom component of the course focused on the psychology literature on teaching and learning mathematics. Readings came from cognitive psychology, developmental psychology, and educational psychology. Principal texts for the course were The Learning Gap (Stevenson & Stigler, 1992) and Knowing and Teaching Elementary Mathematics (Ma, 1999). We also spent several class sessions discussing the videotapes of sample eighth-grade math classes from the Third International Mathematics and Science Study (National Center for Education Statistics, 1996).

I required students to conduct an empirical research project on some aspect of teaching mathematics. This assignment gave them experience conceptualizing and conducting research in a specific applied setting. Ideas for research projects came from assigned readings, class discussions, and is-

¹The Evaluation Thesaurus (Scriven, 1991) defines stakeholder as, “One who has substantial ego, credibility, power, futures, or other capital invested in the program, and thus can be held to be at some degree at risk with it” (p. 334).

Notes

1. We thank three anonymous reviewers for their helpful comments on an earlier version of this article.
2. Send correspondence to Douglas C. Maynard, Department of Psychology, SUNY New Paltz, 75 South Manheim Boulevard, Suite 6, New Paltz, NY 12477–2440; e-mail: maynardkd@newpaltz.edu.
issues that occurred to the college students in teaching their math groups.

Structure and Substance of the Math Instruction

Superordinate goals for the elementary school students were to increase their mathematical fluency with basic skills that generalize to real-world problem solving and to enhance their appreciation of the importance of mathematics. To achieve these goals, I first provided the college students with the school district’s upper grade curriculum goals. During initial sessions with their math groups, college students assessed the competency of their students in terms of these various goals. They then prioritized topics to include in subsequent lesson plans. They met regularly with their supervising classroom teachers for input regarding appropriate math topics to consider.

Weekly meetings of the college class focused on pedagogical techniques and the psychological research from which they were derived. The two most frequently discussed pedagogical techniques had been identified as best practices from cross-cultural research on math instruction (Stigler, Lee, & Stevenson, 1987). I encouraged the college math teachers to employ a problem-based approach to teaching (e.g., Stigler & Stevenson, 1991); every lesson was to be motivated by a specific real-world problem. As part of the problem-based approach, the college students used the Exemplars program (www.exemplars.com). This program includes a large corpus of teacher-developed and teacher-tested math problems on a wide range of topics. Based on the second pedagogical technique, I encouraged the college students to focus on teaching the conceptual process by which solutions are reached rather than simply whether a correct answer is obtained.

Obtaining Buy-In2 From the Participating School

The school selected for this program is two blocks from the Claremont Colleges. I met with the principal and the five participating teachers several times prior to beginning the program. The program was optional for the teachers; all chose to participate. Although each teacher welcomed the program enthusiastically, much time was necessary to ensure the teachers’ cooperation with the goals and structure of the program.

Program Goals of the Major Stakeholders and Results

Goals of the Professor and Results

I developed this program to energize my teaching, and this goal was more than satisfied. Although setting up and running this program was more effortful, time consuming, and frustrating than teaching a traditional course, it was also more rewarding. I liked the changes that I observed in the college students, and it was exciting to watch the change in the elementary school students’ enthusiasm for math. Students’ comments in class as well as their field notes revealed that, over the semester, most became more respectful of the difficult job that teachers face, less externalizing of the problems in schools, more sensitive to the needs of school-age children, and more aware of the need for research on classroom learning. Four of the 15 students in the class made arrangements to continue working with their math group as volunteers the following year.

Goals of the College Students and Results

At the end of the course, I asked the college students to specify their top three personal reasons for enrolling in this course and to indicate, on a 5-point scale ranging from 1 (goal not satisfied) to 5 (goal satisfied), the fulfillment rating for each goal. The most frequently mentioned goal for taking this class is best expressed in a student’s statement that, “I really love working with children, so I hoped to form strong relationships with all of my students. I wanted to feel like I was having some impact on their lives.” For the 7 students who expressed this goal, the mean fulfillment rating was 4.57 (SD = .49).

The second most frequently mentioned goal was to explore teaching as a possible career choice. For the 6 students who expressed this goal, the mean fulfillment rating was 4.67 (SD = .47).

The third most frequently mentioned goal is reflected in the statement, “I am interested in a change from the intellectual/abstract/classroom basis of learning predominant among college courses.” For the 3 students who expressed this goal, the mean fulfillment rating was 5.00 (SD = 0).

Goals of the Principal and Teachers and Results

The principal and teachers welcomed this program because they wanted an intervention that increased their students’ math ability. Through this program, every upper grade student in the school received an extra 3 hr of math instruction each week of the semester, in a group of 10 or fewer students. Fourteen students randomly selected from the program were interviewed after the program to assess their perceptions. The modal comments were that the program increased their confidence in math and they found math more enjoyable.

To assess the effectiveness of the program in terms of the grade-school students’ math achievement, we compared performance on the math subtests of the Stanford 9 standardized test in April of the year in which this intervention program was implemented with performance of the same students on the same subtests the previous year. Because Stanford 9 scores are presented as percentile ranks, without an enhanced instructional intervention, students typically stay at the same percentile rank from year to year. For the students in our program, the mean improvements were 5% for fourth graders, 12% for fifth graders, and 13% for sixth graders.

2The term buy-in is a common concept in the program evaluation literature. It refers to the process of obtaining the cooperation of the major stakeholder.
Conclusions

For both the professor and the college students, this course was more demanding and time consuming than a typical college course. However, the rewards were numerous. It was gratifying for the college students to watch the metamorphosis of their students from math underachievers to competent and enthusiastic students of math. Although it is not possible to draw a causal link between this service-learning program and the improvement in math scores of the elementary school students over the course of the semester, the improvements were applauded by the principal and teachers. This success served to enhance the college students’ appreciation of psychology by seeing psychological principles effectively applied. For me, developing this university–community partnership for teaching psychology was far more engaging than traditional classroom teaching.

Similar opportunities could be developed for teaching reading, science, or other academic disciplines. Within psychology there is a rich research literature on the principles underlying teaching and learning within each of these academic domains.

References


Note

Send correspondence and requests for the complete syllabus and reading list to Kathy Pezdek, Department of Psychology, Claremont Graduate University, Claremont, CA 91711; e-mail: Kathy. Pezdek@cgu.edu.